

# Feature Article

## Pediatric Dentistry

### Implementing an Infant Oral Care Program

Francisco Ramos-Gomez, DDS, MS, MPH; Bonnie Jue, DDS; and C. Yolanda Bonta, DMD, MS, MS

Copyright 2002 *Journal of the California Dental Association*.

#### Authors

Francisco J. Ramos-Gomez, DDS, MSc, MPH, is an associate professor in the Department of Growth and Development, Division of Pediatric Dentistry, at the University of California San Francisco and the director of Pediatric Dental Services at San Francisco General Hospital.

Bonnie L. Jue, DDS, is an adjunct faculty member at UCSF School of Dentistry and the University of the Pacific School of Dentistry. She is part of the research team at UCSF for the prevention of early childhood caries, and is a private practitioner in San Francisco.

C. Yolanda Bonta, DMD, MS, MS, is the director of technology, global professional relations, and marketing at Colgate Palmolive Company.

#### abstract

*The American Academy of Pediatric Dentistry, American Dental Association, American Public Health Association, Association of State and Territorial Dental Directors, California Dental Association, and California Society of Pediatric Dentists currently recommend that children receive their first dental evaluation within the first year of life. Providing early care to children from ages 6 months to 5 years offers an opportunity to educate and inform parents about their children's oral health. Anticipatory guidance -- counseling of parents by health providers about developmental changes that will occur in their children between health visits -- for children's dental health is an important part of preventive care. It may be the most effective way to prevent problems that traditional infectious disease models have failed to address, such as early childhood caries. The model of anticipatory guidance is valuable for dental professionals because it emphasizes prevention of dental problems rather than restorative care. A comprehensive infant oral care program utilizes (1) oral health assessment at regularly scheduled dental visits, (2) risk assessments, (3) counseling sessions with parents during either regular dental visits or additional visits scheduled if a child is deemed at risk, (4) preventive treatment such as the application of fluoride varnish or sealants, and (5) outreach and incentives to reinforce attendance. Facilitating access to early and regular dental care is a crucial part of any effective intervention strategy, and intervention techniques should be tailored to the community being served.*

Dental caries is a transmissible, infectious, chronic, preventable disease. It is five times more common than asthma and seven times more common than hay fever in children.<sup>1</sup> Therefore,

there is an increasing trend toward providing dental care to children before the age of 3 years. The rationale for early dental intervention with infants and parents includes determining the infant's risk status based on information from parents and performing a dental examination before potential dental problems have a chance to manifest and become more complex and costly to treat.<sup>2,3</sup> The purpose of an infant oral health programs is to improve access to care, to provide counseling and anticipatory guidance for children age 6 months to 5 years, and to prevent early childhood caries. Most importantly, such programs are meant to make the dental team more proactive in preventive dentistry rather than reactive with full-mouth rehabilitation.<sup>4</sup> Many children seeking emergency dental treatment have ECC, also known as baby bottle tooth decay or nursing caries. Its prevalence varies from 5 percent to 72 percent, depending on diagnostic criteria, age, race, and population.<sup>5</sup> More than 40 percent of children in the United States have tooth decay by the time they reach kindergarten.<sup>6</sup> The symptoms of ECC include severe pain, infection, abscesses, chewing difficulty, malnutrition, gastrointestinal disorders, and low self-esteem.<sup>7</sup> Decay of primary teeth can affect children's growth, lead to malocclusion by adversely affecting the alignment of the developing permanent dentition, and cause poor speech articulation. ECC may be associated with future decay of the permanent dentition.<sup>8</sup> According to Nowak and Warren, infants who are of low socioeconomic status, whose mothers have a low education level, who consume sugary foods, or who have high salivary *Streptococcus mutans* levels are 32 times more likely to have caries at the age of 3.5 years than children in whom those risk factors are not present.<sup>9</sup> ECC patients are difficult to manage in the dental chair and are often impossible to treat under normal clinical conditions without the aid of conscious sedation or general anesthesia. All of these factors make this disease expensive to treat, and many of the patients' parents cannot afford to follow the dentist's recommendations. A recent study concluded that ECC is a preventable condition that may begin as an infant's teeth erupt.<sup>10</sup>

Because of the scarcity of funds, lack of insurance, and difficulty in gaining access to dental providers, the population most in need of medical and dental care for ECC does not receive it. In the United States, more than 108 million children and adults do not have dental insurance, which is more than 2.5 times the number of those who do not have medical insurance. Children in this group are 2.5 times less likely than insured children to receive dental care.<sup>7</sup> Yet, the children lacking dental insurance are three times more likely to have dental needs than those with either public or private insurance. These statistics reflect the urgent need to address this disparity, especially for children with special health care needs, who are nearly six times more likely to have unmet dental treatment concerns than their insured peers.<sup>11</sup> The prevention and treatment of ECC are complicated by medical, physical, social, or psychological situations; and children affected by the condition tend to have more dental disease and more missing teeth than the general population.<sup>12</sup>

To further complicate matters, many caretakers and providers may not understand the necessity of regular dental care for primary teeth or the importance and timing of a child's first dental visit. Caretakers and providers may also be unaware that they can be the cause of their child's ECC, which has been found to be a very common infectious disease.<sup>13-15</sup> By facilitating access to dental care and improving parents' knowledge of ECC and other dental problems, dental professionals can improve oral health for these patients.

### **Prenatal Care Intervention Programs for Pregnant Women**

The earliest and probably best opportunity to provide education about infant oral health is during

pregnancy. Outreach to pregnant women through prenatal programs effectively improves infant oral health.<sup>16</sup> Women are highly motivated to give their child the best possible care, and the likelihood of better health for the child and reduced future dental costs can motivate parents. Because poor maternal periodontal health has been associated with pre-term birth and low birth weight, dental care and prenatal counseling for mothers may result in better pregnancy outcomes.<sup>17</sup> Prenatal counseling programs should also educate parents about healthy feeding habits for their children, including the avoidance of using food to comfort them or modify their behavior.

Several studies have shown that reductions in *S. mutans* in pregnant women may result in delayed or diminished transfer of caries-inducing bacteria to infants. Brambilla and colleagues showed that a low-cost program of dietary counseling, dental prophylaxis and instruction, and appropriate use of systemic and topical fluoride and topical chlorhexidine during pregnancy could delay or prevent *S. mutans* infection in children of infected mothers, which resulted in lower overall rates of dental caries in children.<sup>18</sup> Another study found that pregnant women who had dental visits every six months beginning sometime before they gave birth reduced the incidence of caries and of *S. mutans* colonization in their children.<sup>19</sup>

A new University of California at San Francisco program based at San Ysidro Community Health Center will work with pregnant women beginning in the second trimester of pregnancy to proactively manage *S. mutans* levels. The intention is to educate the mothers-to-be about the infectious nature of ECC and to monitor their *S. mutans* levels. Fluoride varnish treatments will begin for a subgroup of children when teeth erupt and will continue until the children are 3 years old. The cariogenic threshold levels of *S. mutans* and *Lactobacilli* are lower in younger children and toddlers than older children, and consequently infants and toddlers are at greater risk.<sup>10</sup> San Ysidro, Calif., is a low-socioeconomic-status area with a large migrant Hispanic community who engage in agricultural work and are affected by border health issues. Successful preventive efforts there would provide a valuable model for decreasing disparities in the availability and delivery of dental care in other disadvantaged communities.

## **Intervention Programs for Children**

For too long, "intervention" has occurred only after dental disease has been detected. The infection can be present before carious lesions are observed clinically. Thus, the treatment of caries through the use of fillings and other interventions does not take place until after the child's mouth has already been damaged. The focus of the intervention strategies outlined below is to prevent the initial formation of dental caries by counseling caregivers on proper dental hygiene and by treating the mouth with antibacterial and tooth-protecting substances.

Children should be screened and actively recruited for prevention programs. Every child, starting at 1 year of age, should have a dental evaluation encompassing comprehensive preventive care at least twice a year. Evaluations should include four primary components: oral health/risk assessment, counseling, preventive treatment, and outreach and incentives.

## **Risk Assessment Visit**

Risk assessment should be part of a regular, thorough oral-health assessment visit. Risk assessment is based on the recommendations of the American Academy of Pediatric Dentistry for anticipatory guidance in pediatric dental care.<sup>20</sup> It entails several visits to a dentist, from the first year of life to age 5 years. Risk-assessment visits should also include a diet evaluation

survey, as well as a survey about parental knowledge, attitudes, and behavioral practices including oral health status of siblings and parents, and socioeconomic status (**Figure 1**). Patients from underserved communities are at higher risk for dental decay. Anticipatory guidance could include checks of *S. mutans* and *Lactobacilli* levels, particularly if a more cost-effective means of testing becomes available. Other checks may include examinations of calcium, phosphate, and fluoride levels in saliva, ECC development, and effects of drug-induced caries.

Before infants or toddlers undergo a dental examination, the dental team should establish a positive relationship with the patient and the parents. To initiate an effective connection with the child, the examiner can introduce himself to the child and parent with a toothbrush and observe the child's behavior (**Figure 2a**). The clinician may begin the examination procedure by placing the child in the dental chair or, in the case of very young children, in the "knee-to-knee" position. In this position, the examiner and parent sit face to face with their knees touching to make a comfortable support for the young infant (**Figure 2b**). Then the child, facing the parent, wraps his or her legs around the parent's waist and lies down across the laps of the examiner and parent (**Figure 3**). In this position, the examiner can look directly into the patient's mouth and evaluate the teeth. The handle of the toothbrush can then be used as a mouth prop or mouth opener to prevent sudden closure. The child's oral condition may be assessed with a dental mirror, and the findings recorded. Relevant information, as well as recommendations for follow-up, is passed along to the parent.

## **Counseling Visit**

Based on the same recommendations as those for risk assessment, counseling of parents entails additional visits if the child is at high risk (**Figure 4**). Counseling visits should cover oral development, fluoride intake, oral hygiene/health, habits, diet and feeding practices, and injury prevention. All of these issues depend upon the age of the child, with specific recommendations for different ages. The following guidelines for counseling topics and risk assessment issues are organized by major topics with age-specific concerns highlighted in the text.

## **Oral Development**

Oral development issues for 6- to 12-month-old children include eruption of the first primary tooth, planning for the eruption of primary molars, and the formation of permanent teeth.<sup>21</sup> Dentists should show oral anatomic landmarks to parents during the examination of the infant and discuss oral stimulators, such as pacifiers. It is also important to review patterns of eruption and teething facts and myths. Parents need to be educated about the important role primary teeth play in biting and chewing for healthy nutrition, and speaking clearly to promote self-esteem and education. For parents of 12- to 24-month-old children, understanding completion of the primary dentition, concepts of occlusion and arch length and spacing, and formation of permanent teeth are important.<sup>22</sup> The dentist should discuss the importance of space maintenance and the effects of bruxism, and review molar, canine, and incisal positions with parents during examination. By the age of 6 years, children will undergo the exfoliation of primary teeth and the eruption of the first permanent teeth.<sup>23</sup> Molar occlusion and healthy gums are important issues to discuss at this time. The dentist should review patterns of eruption, discuss permanent molar occlusion with parents, point out permanent molar occlusal anatomy, and describe healthy periodontal tissues.

## **Fluoride**

Topical fluoride use is not recommended until after the age of 6 months. However, systemic

fluoride intake may be beneficial from birth, although there is controversy regarding this approach. Some researchers suggest systemic fluoride from birth may not be as beneficial as topical applications and its excess could lead to fluorosis. Children should be assessed at all visits for fluoride need based on dental status and sources of fluoride (water and food inside and outside of the home). Dentists should be aware of community water fluoridation, or the lack of it, in the region where their patients live. If fluoride use is indicated, it should be administered in an age-appropriate fashion. The dentist should be certain to educate parents about the benefits of systemic fluoride action, which primarily involves fluoridation of the family's water supply or, if necessary, fluoride supplements for the child, prescribed by the pediatrician or dentist. For the 12- to 24-month-old child, proper use of topical fluoride depending on method of administration, such as fluoride-containing dentifrices, can be introduced as long as the child is able to spit out the substance thoroughly. The issues of fluoride toxicity and safety and management of accidental ingestion should always be discussed with the parents or caretakers.<sup>24</sup>

## **Oral Hygiene and Health**

The frequency of dental visits should be based on risk assessment, and the importance of these visits should be discussed with parents. This allows the health care provider to customize a dental prevention program for the individual patient; some patients may need exams every six months, while others may benefit more from three-month recall appointments. One of the most frequent variables in caries risk assessment models is past caries experience.<sup>25,26</sup> Other risk indicators may include socioeconomic factors, such as income, race or ethnicity, and psychosocial factors, such as health attitudes.<sup>27,28</sup> For children of all ages, regular dental care is important. Appropriate oral hygiene techniques vary with the age of the child.

For infants 6 to 12 months of age, microflora acquisition from maternal or caregiver sources should be explained to parents; and the dentist should review oral hygiene techniques for infants with the caregiver, using a soft brush and pea-sized amount of dentifrice or no dentifrice. Parents of children 12 to 24 months of age should be educated about the type of brush to use with the child, the role of a dentifrice in oral hygiene and health, the roles of the child and parent in brushing, and the frequency and setting of oral hygiene. The dentist should review home oral care procedures and compliance and work with parents to solve problems. From the ages of 2 to 6 years, the child's role in maintaining his or her own oral health becomes more important; and dentists should review home oral care procedures and compliance and recommend that the child begin brushing with parental supervision and assistance. By the time the child's first permanent molar erupts, the parents should be informed of the benefits of dental sealants, as they play an important role in caries prevention.<sup>29</sup> This is also the time to explain dental radiographs and discuss parental separation or presence at dental visits and normal child anxiety.<sup>24,30-32</sup>

## **Habits**

Certain sucking behaviors can be deleterious to dental health.<sup>32</sup> Early discussion of these habits with parents or guardians of 6- to 12-month-old infants should include the role of the mouth in infantile exploration, pacifier use (safety and hygiene issues), and the effects of digit-sucking and breast-feeding on the mouth. Visits for 12- to 24-month-old children should include a discussion or review of nonnutritive sucking and the safe use of a pacifier. Discussions with parents about how to stop habitual thumb-sucking behavior in 2- to 6-year-old children are warranted.

## **Diet and Feeding Practices**

When the baby is 6 months of age, the mother should ask her pediatrician or dentist about fluoride supplements for the baby, especially if the family lives in a community where the water is not fluoridated. The importance of putting the baby to bed without a bottle should also be stressed in this early phase of the baby's life to prevent the habit from forming. ECC can develop if the baby is allowed to suck on a bottle containing sweetened liquid during the night, as sugars can cling to teeth and initiate the decay process, unless the content of the bottle is water.

## **Injury Prevention**

Oral trauma can be a problem at any age. Dentists should give parents of 6- to 12-month-old infants information about what to do if an infant experiences oral trauma and contact numbers in case of emergency. As children become older and more mobile (12 to 24 months), electrical cord injuries and trauma to primary teeth are more likely injuries. Dentists should review normal dental and oral anatomy with parents during the examination. Parents should be provided with information on home child-proofing, electrical cord safety, use of car seats, and prevention of chemical substance ingestion, including exposure to lead. Recent studies have shown that salivary gland function is impaired by prenatal exposure to lead, which is a serious problem in many low-income inner-city families and may increase susceptibility to caries.<sup>35</sup> Parents should also be encouraged to develop plans for oral trauma management for children in preschool and child care. Children in the 2- to 6-year-old age group may sustain oral and dental injuries from sports activities (such as bicycling or skating) or car accidents. Injuries at this age may affect not only primary but also permanent teeth. Dentists should encourage the use of protective sports equipment (helmets, pads, and mouthguards) when appropriate and review differences between primary and permanent teeth with parents during examination.<sup>36</sup> Parents should again be encouraged to prepare a plan for home and school for oral injury and treatment options, and to keep children in car seats during travel as required by law.

## **Preventive Treatment**

Preventive treatment (**Figures 5 through 9**) includes the application of fluoride varnish such as Duraphat (Colgate), Duraflor (Pharmascience), or CavityShield (OMNI). A semi-annual application of varnish has been tested most often.<sup>37,38</sup> Other studies have shown that an intensive treatment of three applications of Duraphat in one week per year (over three to four years) may reduce caries by 46 percent to 67 percent in proximal surfaces.<sup>39,40</sup> The regimen of Twetman and colleagues, which consists of varnish applications at three-month intervals, reduces caries by 40 percent to 51 percent among children age 4 to 5 years.<sup>41</sup> Furthermore, fluoride varnish treatments can also inhibit carious lesions in pit and fissure surfaces by up to 50 percent to 70 percent.<sup>42,43</sup>

Additionally, brushing or swabbing the teeth with a very small amount of chlorhexidine solution can decrease *S. mutans* and *Lactobacilli* in the mouths of babies at risk. Other studies have shown that swabbing with Betadine (povidone iodine) can also reduce the levels of these pathogens.<sup>19,44</sup> Recent clinical studies support findings that suggest that the replacement of sucrose with sorbitol and xylitol may significantly decrease the incidence of dental caries. Subjects using these sugar substitutes had a 30 percent to 60 percent decrease in dental decay. The xylitol or sorbitol was used as the sugar substitute in chewing gum or toothpaste, in which

the xylitol demonstrated the highest rate of caries reduction.<sup>45</sup> Another study, involving Head Start preschool students, suggests that chewing xylitol gum is well-accepted by children.<sup>46</sup> Furthermore, it has been concluded that mothers who regularly used xylitol chewing gum prohibited the transmission of *S. mutans* to their children, thereby preventing dental caries from forming.<sup>47</sup> However, this mode of delivery is not feasible for most infants and toddlers; therefore, the "Fall-Asleep Pacifier," a slow-release administration device, was studied as a prophylactic measure against oral infection with *S. mutans* and dental caries in 1-year-old children. The results were beneficial, possibly because of the advantages of the prolonged intraoral bioavailability of the NaF-xylitol-sorbitol preparation administered via the pacifier.<sup>48</sup>

Children should be followed prospectively for at least three years, and their oral health should be assessed routinely. Thereafter, the goal should be to keep the child as regular patient in the office to receive and maintain ongoing care as part of a regular dental home. Treating patients from an early age has an unexpected benefit on behavior modification: It desensitizes them to dental environment and the dental experience. It is wonderful to see young children jump into the dental chair and eagerly await their treatment.

### **Outreach and Incentives**

Outreach and incentives are intended to reinforce attendance at the assessments and to reinforce habits recommended in the counseling visits. The surgeon general's oral health report cited factors affecting oral health seeking behaviors of pregnant and parenting teens. Many of the participants cited a general need for improvements in the delivery of care by health professionals, including better oral health teaching methods, better appointment and reminder systems, and shorter waiting times for appointments.

These concerns can be addressed by the dental office or clinic staff by incorporating the following guidelines into their regular protocol. By setting their next appointments even before they leave the office, the patients may feel more accountable for the next visit. The patients should be called a few days or the day before their appointment to confirm the date and time; this process may greatly reduce the number of missed appointments and unproductive clinic time. In addition, the appointment should include time for counseling the patient and parents. This should be done in a culturally and linguistically sensitive manner. This practice allows the practitioner more time to educate the parents on dental health care without falling behind schedule. Advocacy and counseling by the hygienist was helpful in the Spokane Partnership Program in Spokane, Wash.<sup>49</sup>

Incentives may include dental care products, such as toothpaste or toothbrushes, and age-appropriate toys. The incentives should be contingent on increases in the assessed knowledge of the caregiver (e.g., not putting a child to sleep with a bottle) and favorable results of risk assessment. Achievement charts can be monitored at home as a game with the child.

### **Conclusion**

ECC is a significant dental disease that can have devastating effects on both the primary and secondary dentition. The burden of this disease is disproportionately carried by low-income and other underserved children. For too long, the model of treatment has been to address an already diseased dentition; in contrast, a program based on anticipatory care guidance would seek to shift the focus to the prevention of caries in children (**Table 1**).

From birth to 6 months of age, before the baby's first teeth erupt, it is essential for the mother to maintain her oral health. New mothers should see a dentist for regular dental exams and cleanings, usually every three to six months. These visits have the important benefit of reducing the amount of bacteria in the mother's mouth, which can adversely affect the dental health of the child. The baby's gums should be cleaned daily with a clean, damp washcloth or piece of gauze starting within the first few days of birth. Gently wiping the gums and tongue after feedings keeps the baby's mouth clean and helps the child become accustomed to regular dental maintenance at an early age.

Primary teeth may begin to erupt around the age of 6 months. Parents should be instructed in how to gently clean the teeth and gums with a soft, child-sized toothbrush or a clean, damp washcloth. Between 5 and 12 months, babies should be introduced to drinking from a training cup. At 12 to 18 months, babies should be weaned off the bottle or from nursing.

By 18 to 24 months of age, the toddler should be off the bottle or nursing and the family should be in the habit of taking the child to the dentist for regular check-ups, about twice a year. The dentist might ask about the child's eating patterns and warn about risks from constant snacking. The baby's teeth should be brushed in the morning and before bedtime, and the child can begin to learn how to hold the toothbrush at this age. However, the child will need assistance in brushing the teeth for years to come, as most children do not develop the coordination to brush effectively by themselves until they are 6 to 8 years old. One study has determined that children who brush their teeth themselves are more likely to have visible plaque after brushing than children whose teeth are cleaned by their parents.<sup>50</sup> So, even though children should be encouraged to try brushing their own teeth after the age of 2, the parents or caretakers must still continue to take an active role in the child's brushing and flossing routine.

This proactive approach -- including services and education that emphasizes risk assessment, regular dental appointments, counseling sessions, preventive treatment, and outreach and incentives -- makes it possible for dental practitioners to greatly reduce oral infections among affected populations. Providing oral health education and counseling to pregnant women in a culturally and linguistically sensitive manner may also be an effective means of reducing both the risk of adverse pregnancy outcomes and the incidence of ECC in their young children. By establishing an infant oral care program in their practices, dentists can provide a much needed service to their existing patients, while attracting new patients. In addition, adopting a preventive approach to dental care may decrease the need for costly restorative procedures, which could also deliver a corresponding savings for the public health sector. It is a "win-win" situation for all involved by making healthy babies healthier.

## **Acknowledgments**

The authors thank all the staff and faculty of the UCSF Family Dental Center at San Francisco General Hospital and of the Chinatown Health Center Dental Clinic for their support and Dr. Jane Weintraub, Dr. Bob Isman, Helen MacDiarmid, and Stephen Ordway for editorial assistance.

## **References**

1. US Department of Health and Human Services, Oral Health in America: A Report of the Surgeon General. US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, Rockville, MD, 2000.



2. Nowak AJ, Casamassimo PS, Using anticipatory guidance to provide early dental intervention. *J Am Dent Assoc* 126:1156-63, 1995.
3. Ramos-Gomez FJ, Shepard DS, Cost-effectiveness model for prevention of early childhood caries. *J Calif Dent Assoc* 27:539-44, 1999.
4. Brown LJ, Wall TP, Lazar V, Trends in total caries experience: permanent and primary teeth. *J Am Dent Assoc* 131:223-31, 2000.
5. Kaste LM, Marianos D, et al, The assessment of nursing caries and its relationship to high caries in the permanent dentition. *J Public Health Dent* 52:64-8, 1992.
6. Pierce KM, Rozier RG, Vann WF Jr, Accuracy of pediatric primary care providers' screening and referral for early childhood caries. *Pediatrics* 109(5):E82-2, 2002.
7. US Department of Health and Human Services, Oral health in America: a report of the surgeon general -- executive summary. U.S. Department of Health and Human Services, Rockville, MD, 2000, pp 1-13.
8. Almeida AG, Roseman MM, et al, Future caries susceptibility in children with early childhood caries following treatment under general anesthesia. *Pediatr Dent* 22(4):302-306, 2000.
9. Nowak AJ, Warren JJ, Infant oral health and oral habits. *Pediatr Clin North Am* 47:1043-66, 2000.
10. Ramos-Gomez FJ, Weintraub JA, et al, Bacterial, behavioral and environmental factors associated with early childhood caries. *J Clin Pediatr Dent* 26:165-73, 2002.
11. Manski RJ, Edelstein BL, Moeller JF, The impact of insurance coverage on children's dental visits and expenditures, 1996. *J Am Dent Assoc* 132:1137-45, 2001.
12. University of the Pacific School of Dentistry, Practical protocols for the prevention of dental disease in community settings for people with special needs -- 2002 consensus protocol.
13. Smith DJ, Anderson JM, et al, Oral streptococcal of infants. *Oral Microbiol Immunol* 8:1-4, 1993.
14. Berkowitz RJ, Jones P, Mouth to mouth transmission of the bacterium *Streptococcus mutans* between mother and child. *Arch Oral Biol* 30:377-9, 1985.
15. Li Y, Caufield PW, The fidelity of initial acquisition of mutans streptococci by infants from their mothers. *J Dent Res* 74:681-5, 1995.
16. Casamassimo PS, Maternal oral health. *Dent Clin North Am* 45:469-78, 2001.
17. Dasanayake AP, Poor periodontal health of the pregnant woman as a risk factor for low birth weight. *Ann Periodontol* 3:206-12, 1998.
18. Brambilla E, Felloni A, et al, Caries prevention during pregnancy: results of a 30-month study. *J Am Dent Assoc* 129:871-7, 1998.

19. Slavkin HC, *Streptococcus mutans*, early childhood caries and new opportunities. *J Am Dent Assoc* 130:1787-90, 1999.
20. Journal of the American Academy of Pediatric Dentistry, Pediatric Dentistry. Special Issue: Reference manual 23(7), 2001-2.
21. Kohler B, Andreen I, Influence of caries-preventive measures in mothers on cariogenic bacteria and caries experience in their children. *Arch Oral Biol* 39:907-11, 1994.
22. Jenkins S, Addy M, Newcombe R, Evaluation of a mouthrinse containing chlorhexidine and fluoride as an adjunct to oral hygiene. *J Clin Periodontol* 20:20-5, 1993.
23. Aaltonen AS, Tenovu J, Association between mother-infant salivary contacts and caries resistance in children: a cohort study. *Pediatr Dent* 16:110-6, 1994.
24. Zickert I, Emilson CG, Krasse B, Effect of caries preventive measures in children highly infected with the bacterium streptococcus mutans. *Arch Oral Biol* 27:861-3, 1982.
25. Abernathy JR, Graves RC, et al, Development and application of a prediction model for dental caries. *Community Dent Oral Epidemiol* 15:24-8, 1987.
26. Beck JD, Weintraub JA, et al, University of North Carolina Caries Risk Assessment Study: comparisons of high risk prediction, any risk prediction, and any risk etiologic models. *Community Dent Oral Epidemiol* 20:313-21, 1992.
27. Powell LV, Caries risk assessment: relevance to the practitioner. *J Am Dent Assoc* 129:349-53, 1998.
28. Gillcrist JA, Brumley DE, Blackford JU, Community socioeconomic status and children's dental health. *J Am Dent Assoc* 132:216-22, 2001.
29. Dennison JB, Straffon LH, Smith RC, Effectiveness of sealant treatment over five years in an uninsured population. *J Am Dent Assoc* 131:597-605, 2000.
30. Berkowitz RJ, Turner J, Green P, Primary oral infection of infants with *Streptococcus mutans*.  
*Arch Oral Biol* 25:221-4, 1980.
31. Li Y, Caufield PW, The fidelity of initial acquisition of mutans streptococci by infants from their mothers. *J Dent Res* 74:681-5, 1995.
32. Rogers AH, The source of infection in the intrafamilial transfer of *Streptococcus mutans*. *Caries Res* 15:26-31, 1981.
33. Berkowitz RJ, Turner J, Hughes C, Microbial characteristics of the human dental caries associated with prolonged bottle-feeding. *Arch Oral Biol* 29:49-51, 1984.
34. Falco MA, The lifetime impact of sugar excess and nutrient depletion on oral health. *Gen Dent* 49(6):591-5, 2001.
35. Bowen WH, Response to Seow: biological mechanisms of early childhood caries.

36. Ranalli DN, Prevention of sports-related traumatic dental injuries. *Dent Clin North Am* 44(1):35-51, 2000.
37. Seppa L, Studies of fluoride varnishes in Finland. *Proc Finn Dent Soc* 87:541-7, 1991.
38. de Bruyn H, Arends J, Fluoride varnishes -- a review. *J Biol Buccale* 15:71-82, 1987.
39. Petersson LG, Arthursson L, et al, Caries-inhibiting effect of different modes of Duraphat varnish reapplications: a 3-year radiographic study. *Caries Res* 25:70-3, 1991.
40. Skold L, Sundquist B, et al, Four-year study of caries inhibition of intensive Duraphat application in 11-15-year-old children. *Community Dent Oral Epidemiol* 22:8-12, 1994.
41. Twetman S, Petersson LG, Pakhomov GN, Caries incidence in relation to salivary mutans streptococci and fluoride varnish applications in preschool children from low- and optimal-fluoride areas. *Caries Res* 30:347-53, 1996.
42. Petersson LG, On topical application of fluorides and its inhibiting effect on caries. *Odontologisk Revy* S34:1-36, 1975.
43. Seppa L, Tuutti H, Luoma H, Three-year report on caries prevention of using fluoride varnishes for caries risk children in a community with fluoridated water. *Scand J Dent Res* 90:89-94, 1982.
44. Lopez L, Berkowitz, et al, Topical antimicrobial therapy in the prevention of early childhood caries. *Pediatr Dent* 21(1):9-11, 1999.
45. Hayes C, The effect of non-cariogenic sweeteners on the prevention of dental caries: a review of the evidence. *J Dent Educ* 65:1106-9, 2001.
46. Auto JT, Court FJ, Acceptance of the xylitol chewing gum regimen by preschool children and teachers in a Head Start program: a pilot study. *Pediatr Dent* 23:71-4, 2001.
47. Isokangas P, Soderling E, et al, Occurrence of dental decay in children after maternal consumption of xylitol chewing gum, a follow-up from 0-5 years of age. *J Dent Res* 79:1885-9, 2000.
48. Aaltonen AS, Suhonen JT, et al, Efficacy of a slow release device containing fluoride, xylitol, and sorbitol in preventing infant caries. *Acta Odontol Scand* 58:285-92, 2000.
49. Milgrom P, Hujoel P, et al, Making Medicaid child dental services work: a partnership in Washington state. *J Am Dent Assoc* 128:1440-6, 1997.
50. Habibian M, Roberts G, et al, Dietary habits and dental health over the first 18 months of life. *Community Dent Oral Epidemiol* 29:239-46, 2001.

To request a printed copy of this article, please contact/Francisco J. Ramos-Gomez, DDS, MS, MPH, UCSF School of Dentistry, 707 Parnassus Ave., Room D1021, Box 0753, San Francisco, CA 94143-0753.

## Legends



**Figure 1.** The dentist takes a young patient's health history.

**Figure 1.** The dentist takes a young patient's health history.



**Figure 2a.** The dentist shows a young patient a toothbrush to observe his behavior.



**Figure 2b.** The dentist starts to examine the child.



**Figure 3.** The "knee-to-knee" position allows the dentist to examine a young child with the parent's help.



**Figure 4.** Counseling parents is an important part of the dental visit.

**Figure 2a.** The dentist shows a young patient a toothbrush to observe his behavior.

**Figure 2b.** The dentist starts to examine the child.

**Figure 3.** The "knee-to-knee" position allows the dentist to examine a young child with the parent's help.

**Figure 4.** Counseling parents is an important part of the dental visit.



**Figures 5 through 9.** Early appointments also consist of preventive measures.



**Figure 6.**



**Figure 7.**



**Figure 8.**



**Figure 9.**

**Figures 5 through 9.** Early appointments also consist of preventive measures.

## **Table 1. Counseling Visit Time Table**

### **Prenatal**

Mothers should take care of their own oral health.



Mothers should know that periodontal disease is associated with prematurity and low birth weight.

---

## **Infancy**

Babies should begin regular visits to a dentist when the first tooth appears, no later than 12 months of age.

*The dentist will:*

- \* Examine the child's mouth, check for cavities and potential problems with teeth and gums.
- \* Teach parents how to care for the child's teeth and gums.
- \* Explain how diet and feeding patterns can cause decay.
- \* Help parents understand the child's oral development.
- \* Check to be sure the child gets proper amount of fluoride
- \* Schedule a continuing care/recall visit based on the child's oral health needs.

*Parents should:*

- \* Prepare baby for brushing by cleaning mouth, gums, and tongue with gauze or a washcloth before teeth appear.
  - \* Brush teeth at least twice a day: after breakfast and before bed.
  - \* Use a child-sized toothbrush; brush with only a smear-sized amount of fluoride toothpaste.
  - \* Know that signs of a healthy mouth include pink gums, white teeth, and no mouth sores.
  - \* Know that good oral hygiene is especially important for babies with special needs.
- 

## **Early Childhood**

Twenty baby teeth will have come in by approximately 30 months of age. Young children should be in the habit of visiting the dentist at least twice a year for regular check-ups.

*The dentist will:*

- \* Conduct a thorough exam and risk-assessment, similar to infancy exams.

- \* Reinforce concepts discussed in infancy exams.
- \* Help address problems like prolonged digit-sucking and pacifier use after age 4.

*Parents should:*

- \* Begin teaching preschooler to brush by gripping the brush for the child and guiding it around the mouth.
- \* Continue helping child brush until at least age 6 years.
- \* Increase toothpaste to pea-sized amount as child learns to spit after brushing.
- \* Coach brushing until age 11, when most children can brush on their own.

**Source: Based on recommendations by the American Academy of Pediatric Dentistry**



JOURNAL OF THE CALIFORNIA DENTAL ASSOCIATION  
© 2002 CALIFORNIA DENTAL ASSOCIATION